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FETHERSTONHAUGH - SMART & BIGGAR
1000 DE LA GAUCHETIERE WEST
SUITE 3300
MONTREAL, QC H3B 4W5
CANADA

| EXAMINER | |
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| GREY, CHRISTOPHER P | |
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**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Application Number: 09/963,487
Filing Date: September 27, 2001
Appellant(s): ROCHON ET AL.

MAILED

DEC 28 2007

Technology Center 2600

Rochon et al.
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed August 29, 2007 appealing from the Office action mailed on 5/15/07

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(8) Evidence Relied Upon**

No evidence is relied upon by the examiner in the rejection of the claims under appeal.

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-3, 25-27, 30, 36, 37, 40-51 and 57 and are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon (CA 2292828) in view of Brewer et al. (US 7002980), hereinafter referred to as Brewer.

<u>Claim 1, 37,, 44</u> Lyon discloses a method for traffic flow control, where information is obtained pertaining to the congestion level (bandwidth utilization level) of an output port (page 3 lines 14-page 4 line 2), where each output port is associated with an output buffer (egress queue) as seen in fig 1 elements 16 a-n and elements 1-N.

Lyon discloses a traffic flow controller (element 100 in fig 1) coupled to the input and output ports, where the traffic controller receives discard information from the output port, and formulates a traffic control message which is sent to the input port (page 2 lines 8-31 and see fig 1 and 2).

Lyon also discloses sending priority information to the controller (Col 2 lines 26-31).

Lyon does not specifically disclose determining from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each egress queue, a discard probability associated with each egress queue.

Brewer discloses a manager **(fig 1, 12)** determining a discard probability **(Col 8 eq 3.3)** using an average byte count by determining the time-weighted average **(Col 8 lines 50-52, where the average byte count is equivalent to the bandwidth of the determined queue, as the average byte count has a unit of data per unit time).** Brewer also discloses using other constants **(Col 8 line 54, further bandwidth utilization info)** to calculate the discard probability.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the accumulator for determining a count of the cells in a queue as disclosed by Lyon, by implementing the WRED algorithm employed by the manager as disclosed by Brewer. The motivation for this modification is to control the drop probability of packets entering the queuing structure **(abstract, line 3-4).**

<u>Claim 2</u> Lyon discloses a cell tap (traffic management entity) for monitoring and transmitting bandwidth priorities (bandwidth utilization information) about an output port (page 3 lines 7-13 and see element 26 in fig 3), where each output port is associated with an output buffer as can be seen in fig 1.

<u>Claim 3</u> Lyon discloses each packet being made up of a plurality of traffic bytes or a plurality of non-traffic bytes (priorities of cells-see page 8 lines 24-33)

Lyon does not disclose obtaining bandwidth utilization information regarding packets received at the egress queues further includes determining for each particular one of the output ports, an average number of traffic bytes received per time unit for each egress queue connected to the particular output port.

Brewer discloses a manager **(fig 1, 12)** determining a discard probability **(Col 8 eq 3.3)** using an average byte count by determining the time-weighted average **(Col 8 lines 50-52, where the average byte count is equivalent to the bandwidth of the determined queue, as the average byte count has a unit of data per unit time).** Brewer also discloses using other constants **(Col 8 line 54, further bandwidth utilization info)** to calculate the discard probability.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the accumulator for determining a count of the cells in a queue as disclosed by Lyon, by implementing the WRED algorithm employed by the manager as disclosed by Brewer. The motivation for this modification is to control the drop probability of packets entering the queuing structure **(abstract, line 3-4).**

Claim 25 Lyon discloses a plurality of output ports (elements 1-N in fig 1). Lyon also discloses each of the plurality of output ports being connected to a respective one of the output buffers (see fig 1 elements 1-N and see fig 3).

Claim 26 Lyon discloses an output port connected to an output buffer, where the output buffer contains a number of output queues (element 30 in fig 3).

Claim 27 The rejection of claim 1 discloses providing discard probability information. Lyon discloses a controller with a processor with a program memory (elements 152 and

154 in fig 9), where a controller is implemented using software programs and variables stored in the memory (page 16 lines 13-21). It would have been obvious to one of the ordinary skill in the art at the time of the invention that any program could be implemented to provide the discard probability.

Claim 30 Lyon discloses a controller discarding or not discarding a packet associated with a particular output port depending on whether or not a threshold is exceeded (page 3 line 14- page 4 line 2).

Lyon does not specifically disclose determining an egress queue for which a packet is destined and transmitting or not transmitting based on the discard probability.

Brewer discloses determining an egress queue for which a packet is destined (Col 7 line 42, queued in the appropriate QOS level queue).

Brewer discloses transmitting or not transmitting based on the discard probability (Col 7 lines 40-42).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the accumulator for determining a count of the cells in a queue as disclosed by Lyon, by implementing the WRED algorithm employed by the manager as disclosed by Brewer. The motivation for this modification is to control the drop probability of packets entering the queuing structure **(abstract, line 3-4).**

Claim 36 Lyon discloses the controller being implemented using a software program (page 16 lines13-21).

Claim 40 Lyon discloses a method for traffic flow control, where information is obtained on a switch fabric pertaining to the congestion level (bandwidth utilization

level) of an output port (page 3 lines 14-page 4 line 2), where each output port is associated with an output buffer (egress queue) as seen in fig 1 elements 16 a-n and elements 1-N.

Lyon discloses a controller for determining discarding information (page 38 lines 9-17 and page 4 lines 3-13).

Lyon discloses a cell forwarder for receiving data destined for the output, and identifying the destination output port and queue (page 9 line 25- page 10 line 6).

Lyon discloses determining discarding information dependent on the results of the comparison, and if the threshold is exceeded for a particular queue, sending a flow control message for discarding (page 38 lines 9-17 and page 4 lines 3-13).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is not exceeded, forwarding the packets accordingly (page 38 lines 9-17 and page 4 lines 3-13).

Lyon does not specifically disclose a drop probability evaluation module connected to the egress queues, said drop probability evaluation entity being adapted to determine a discard probability associated with each of the egress queues on the basis of the bandwidth utilization information.

Brewer discloses a manager **(fig 1, 12)** determining a discard probability **(Col 8 eq 3.3)** using an average byte count by determining the time-weighted average **(Col 8 lines 50-52, where the average byte count is equivalent to the bandwidth of the determined queue, as the average byte count has a unit of data per unit time).**

Brewer also discloses using other constants **(Col 8 line 54, further bandwidth utilization info)** to calculate the discard probability.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the accumulator for determining a count of the cells in a queue as disclosed by Lyon, by implementing the WRED algorithm employed by the manager as disclosed by Brewer. The motivation for this modification is to control the drop probability of packets entering the queuing structure **(abstract, line 3-4).**

<u>Claim 41</u> Lyon discloses each output port is associated with an output buffer (egress queue) as seen in fig 1 elements 16 a-n and elements 1-N.

Lyon discloses a traffic flow controller which receives output port messages (page 7 line 35-page 8 line23), where it would have been obvious to one of the ordinary skill in the art at the time of the invention that the controller is connected to a plurality of output ports, where a plurality of ports may be divided into groups and connected to the controller via a line card within the controller, which transmits and receives data.

Lyon does not specifically disclose a portion of the drop probability evaluation module is provided one each of the output line cards.

Brewer discloses a manager **(fig 1, 12)** determining a discard probability **(Col 8 eq 3.3)** using an average byte count by determining the time-weighted average **(Col 8 lines 50-52, where the average byte count is equivalent to the bandwidth of the determined queue, as the average byte count has a unit of data per unit time).**

Brewer also discloses using other constants **(Col 8 line 54, further bandwidth utilization info)** to calculate the discard probability.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the accumulator for determining a count of the cells in a queue as disclosed by Lyon, by implementing the WRED algorithm employed by the manager as disclosed by Brewer. The motivation for this modification is to control the drop probability of packets entering the queuing structure **(abstract, line 3-4).**

Claim 42 Lyon discloses a traffic flow controller connected to a plurality of input ports (fig 1), where it would have been obvious to one of the ordinary skill in the art at the time of the invention to implement a line card to enhance the connection.

Lyon discloses the forwarder being connected to the traffic flow controller for receiving input port messages (page 9 line 25- page 10 line 6).

Claim 43 Lyon discloses a switch fabric (page 2 lines 5-25).

Claim 45 Lyon discloses a cell forwarder for receiving data destined for the output, and identifying the destination output port and queue (page 9 line 25- page 10 line 6).

Lyon discloses the controller receiving and determining priorities (page 7 line 35- page 8 line 22).

Lyon discloses determining discarding information dependent on the results of the comparison, and if the threshold is exceeded for a particular queue, sending a flow control message for discarding (page 38 lines 9-17 and page 4 lines 3-13).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is not exceeded, forwarding the packets accordingly (page 38 lines 9-17 and page 4 lines 3-13).

<u>Claim 46</u> Lyon discloses a method for traffic flow control, where information is obtained pertaining to the congestion level of an output port (page 3 lines 14-page 4 line 2).

Lyon discloses a traffic flow controller (element 100 in fig 1) coupled to the input and output ports, where the traffic controller receives discard information from the output port, and formulates a traffic control message which is sent to the input port (page 2 lines 8-31 and see fig 1 and 2).

Lyon does not specifically disclose wherein obtaining said congestion information includes determining the amount of bandwidth consumed by packets arriving at the egress entity.

Brewer discloses a manager **(fig 1, 12)** determining a discard probability **(Col 8 eq 3.3)** using an average byte count by determining the time-weighted average **(Col 8 lines 50-52, where the average byte count is equivalent to the bandwidth of the determined queue, as the average byte count has a unit of data per unit time)**. Brewer uses discard info to determine flow control **(Col 7 lines 40-42)**.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the accumulator for determining a count of the cells in a queue as disclosed by Lyon, by implementing the WRED algorithm employed by the manager as disclosed by Brewer. The motivation for this modification is to control the drop probability of packets entering the queuing structure **(abstract, line 3-4).**

<u>Claim 47</u> Lyon discloses determining discarding information dependent on the results of the comparison, and if the threshold is exceeded for a particular queue,

sending a flow control message for discarding (page 38 lines 9-17 and page 4 lines 3-13).

Furthermore, the rejection of claim 46 discloses the details of congestion information.

Claim 48 Lyon discloses wherein not transmitting the received packet to the ingress entity includes discarding the received packet (page 10 lines 4-6).

**Claim 49** Lyon discloses wherein not transmitting the received packet to the ingress entity includes storing the packet in a memory location (fig 4, discarders 1-n, where some form of temporary storage is necessary as a decision is made before discard or transmission (page 10 lines 14-16, while the decoder decodes and determines disclosed information data must be stored temporarily as it awaits a decision)

Claim 50 Lyon discloses a discarder within the forwarder for sending packets on an alternate route for discard in the event that a flow control message indicates that packets are in condition for discard (page 10 lines 7-25).

Claim 51 Lyon discloses if a packet is in condition for discarding setting a specific bit to 1 (page 20 line 26- page 21 line 31).

Claim 57 Lyon discloses an output port connected to an output buffer, where the output buffer contains a number of output queues (element 30 in fig 3).

Lyon discloses an accumulator for maintaining a count of the level of congestion in an output port (page 3 line 14-page 4 line 2).

2. Claims 4, 28, 29, 31-35, 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon (CA 2292828) in view of Brewer et al. (US 7002980), in further view of Blumer (US 2002/0105908)

<u>Claim 4</u> Lyon discloses information being obtained pertaining to the congestion level (allocated bandwidth) of an output port (page 3 lines 14-page 4 line 2), where each output port is associated with an output buffer (egress queue) as seen in fig 1 elements 16 a-n and elements 1-N.

Lyon discloses comparing the count (allocated traffic bandwidth) of each output queue to a bandwidth threshold (average received traffic bytes) for an output queue (page 38 lines 9-17 and page 3 lines 14-page 4 line 2).

Lyon discloses determining discarding information dependent on the results of the comparison, and if the threshold is exceeded for a particular queue, sending a flow control message for discarding (page 38 lines 9-17 and page 4 lines 3-13).

Lyon discloses determining discarding information dependant on the results of the comparison, and if the threshold is not exceeded, forwarding the packets accordingly

The combination of Lyon and Brewer do not specifically disclose increasing or decreasing the discard probability. However, Blumer discloses determining a drop probability dependant on comparing an average buffer fill to a threshold (paragraph 0032).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to combine the comparison of a count of the level of congestion in a particular

queue to a threshold as disclosed by Lyon, with determining a drop probability based on a comparison procedure as disclosed by Blumer. The motivation for this combination is to ensure buffer management through evaluating a buffer occupancy, and performing discarding of packets in the event of congestion. Furthermore, it would have been obvious to one of the ordinary skill in the art at the time of the invention that when the threshold is exceeded as disclosed by Lyon, that discarding increases the chances of discarding, and when the threshold is not exceeded, there is less of a chance of discarding.

<u>Claim 28</u> Lyon discloses a traffic flow controller (element 100 in fig 1) receiving discard information from the output port (page 2 lines 8-31 and see fig 1 and 2). Lyon also discloses the controller only sending flow control messages for discarding packets at the input ports when discarding is necessary (page 3 lines 14-page 4 line 2).

The combination of Lyon and Brewer do not specifically disclose recording the discard probability associated with each egress queue at selected times, and detecting whether a change of at least a predetermined magnitude has occurred in the discard probability associated with the egress queue.

Blumer discloses an average buffer fill value being used to calculate the drop probability, where the average buffer fill value may be calculated on a periodic basis (paragraph 0033)

Blumer discloses comparing the calculated drop probability associated with a buffer to a number (predetermined magnitude) generated by a linear feedback shift register (paragraph 0028).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the controller and buffers as disclosed by Lyon, to receive and transmit respectively, drop probability information when a comparison to a random number has proven to be exceeded within the buffer as disclosed by Blumer. The motivation for this modification is to limit the amount of information being sent to the controller, thus limiting unnecessary congestion.

Claim 29 Lyon discloses a traffic flow controller (element 100 in fig 1) receiving discard information from the output port (page 2 lines 8-31 and see fig 1 and 2). Lyon also discloses the controller only sending flow control messages for discarding packets at the input ports when discarding is necessary (page 3 lines 14-page 4 line 2).

Lyon and Blumer do not specifically disclose recording the discard probability associated with each egress queue at selected times, and detecting whether a change of at least a predetermined magnitude has occurred in the discard probability associated with the egress queue. Lyon also does not disclose providing discard probability after a predetermined amount of time.

Blumer discloses an average buffer fill value being used to calculate the drop probability, where the average buffer fill value may be calculated on a periodic basis (paragraph 0033)

Blumer discloses comparing the calculated drop probability associated with a buffer to a number (predetermined magnitude) generated by a linear feedback shift register (paragraph 0028).

Blumer discloses a decision being made every 2 cycles (paragraph 0052), where a decision is based on whether the discard probability is greater than the number generated.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the controller and buffers as disclosed by Lyon, to receive and transmit respectively, drop probability information when a comparison to a random number has proven to be exceeded within the buffer as disclosed by Blumer. It would have also been obvious to one of the ordinary skill in the art at the time of the invention that the time taken for a decision to be made as disclosed by Blumer could be a predetermined time, where 2 cycles could be the minimum amount of time before further processing. The motivation for this modification is to limit the amount of information being sent to the controller, thus limiting unnecessary congestion.

Claim 31, 32, 54, 55 The combination of Lyon and Brewer do not disclose generating a random number for the received packet; comparing the random number to the discard probability associated with the egress queue for which the received packet is destined, and transmitting or not transmitting based on the comparison.

Blumer discloses generating a random number, comparing a drop probability to the random number and discarding (claim 32) the packet if the drop probability is greater than the random number (paragraph 0026).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the output buffers as disclosed by Lyon, to include the apparatus for

calculating comparing and discarding as disclosed by Blumer. The motivation for this modification is to achieve buffer management and avoid congestion.

Claim 33 Lyon discloses if a packet is in condition for discarding setting a specific bit to 1 (page 20 line 26- page 21 line 9).

Claim 34 Lyon discloses storing/queuing cells within an output buffer/queue (page4 lines 3-13).

Lyon discloses if a packet is in condition for discarding setting a specific bit to 1 (page 20 line 26- page 21 line 9).

Lyon discloses a discarder for discarding and otherwise, forwarding cells (page 2 lines 32-page 3 line 5).

Claim 35 Lyon discloses an accumulator for determining a level of congestion in an output port, where each output port is coupled to an output buffer (page 3 line 14- page 4 line 2).

Lyon discloses an updating procedure, where a count of the congestion level of an output port is updated. Lyon also discloses if a threshold is not exceeded, not discarding the packets.

Lyon discloses setting a bit to 0 if a packet is not to be discarded (page 20 line 26- page 21 line 9).

It would have been obvious to one of the ordinary skill in the art at the time of the invention that the packet previously marked a discardable, could remain in an output queue for some time, and therefore be treated as a regular packet in the updating procedure seeing that the conditions above are met.

3. Claims 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon (CA 2292828) in view of Brewer et al. (US 7002980) in view of Haskin et al. (US 6813242)

Claim 50 Lyon does not specifically disclose not transmitting the received packet packet to the ingress entity includes rerouting the packet along the alternate route.

Haskin discloses rerouting the packet along the alternate route from ingress to an egress in the event of congestion (Col 2 lines 28-50).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to combine the method of rerouting a packet from an ingress to an egress as disclosed by Haskin in the event of congestion as indicated by a flow control message as disclosed by Lyon. The motivation for this combination is to avoid congestion.

4. Claims 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lyon (CA 2292828) in view of Brewer et al. (US 7002980) in view of Jefferies et al. (US 6728253)

Claim 58 Lyon discloses an output port connected to an output buffer, where the output buffer contains a number of output queues (element 30 in fig 3).

The combination of Lyon and Brewer do not specifically disclose the congestion information including variability in the occupancy of each of the egress queues.

Jefferies discloses determining a variable occupancy value of each a plurality of queues (Col 2 lines 25-44), and furthermore using this information to allocate data bandwidth from a source.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to implement the scheduler as disclosed by Jefferies, within the controller as disclosed by Lyon. The motivation for this modification is to allow the flow control messages as disclosed by Lyon to adjust a bandwidth given that the queue occupancy has been evaluated, and it has been determined that a certain level of congestion has bee reached.

**(10) Response to Argument**

(a) With regards to claims 1-3, 25-27,30, 36, 37, 40-51 and 57 the appellant argued that the cited art does not teach the appellants claimed,

" wherein obtaining bandwidth utilization information includes determining the amount of bandwidth consumed by packets received at each egress queues;

Determining , from the bandwidth utilization information and the amount of bandwidth consumed by packets received at each of said egress queues, a discard probability associated with each egress queue"

The examiner maintains that the claimed limitation is disclosed within the cited art, where Brewer specifically discloses determining a QOS level **(Col 8 line 49, equivalent to a bandwidth utilization level)** and an average byte count **(Col 8 eq 3.1, equivalent to a bandwidth consumed by packets at the egress queue)** for a particular queue.

Furthermore, the QOS level and average byte count are used in order to calculate a drop probability (equivalent to a discard probability), as disclosed in Col 8 equation 3.3 and Col 8 lines 57-59.

(b) With regards to claims 1-3, 25-27,30, 36, 37, 40-51 and 57 the appellant argued that Brewer does disclose determining the amount of bandwidth consumed by packets received at each of said egress queue. The appellant argues that Brewer's average byte count which is a measure of data per unit time in a queue is not equivalent to the amount of bandwidth consumed because the measurement unit of bandwidth is a number of bytes per unit time.

The examiner maintains that the claimed limitation interpreted within its broadest sense is disclosed within Brewer. In response to appellant's argument that the reference fails to show the measurement unit of bandwidth being a number of bytes per unit time, it is noted that the features upon which applellant relies are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). No where within the claim does the appellant claim the amount of data per unit of time.

Furthermore, the bandwidth within a channel is different from the bandwidth within a queue, where the bandwidth within a queue is equivalent to the capacity of data in that queue. In the case of Brewer, the appellant admits to Brewer showing a queue

depth being a number of bytes, where that number of bytes is equivalent to the capacity or bandwidth of that queue.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Christopher Grey

C. Grey Dec 21, 2007

Conferees:

Doris To

DORIS H. TO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

Kwang Yao

KWANG BIN YAO
SUPERVISORY PATENT EXAMINER